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Grade 9 Mathematics Pilot Test Provincial Results

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GRADE 9 MATHEMATICS PILOT TEST

PURPOSE OF THE REPORT

This report provides information about the results achieved by students who wrote the June 1988 Grade 9 Mathematics Pilot Test.

Participation in the new Grade 9 Mathematics Program during the 1987-88 school year was not mandatory, and the number of schools who voluntarily participated in the program was small compared to the total Grade 9 population. Therefore, the results are not generalizable to the total population of Grade 9 students. They do, however, reflect student performance at the end of the first year of the implementation of the new junior high mathematics program.

Jurisdictions that participated in the new Grade 9 Mathematics Program will receive this report and summary reports of their own jurisdiction and school results. Jurisdictions that did not participate in the new program will receive this report and a test booklet.

This report is intended to supplement the following Alberta Education documents:

- the school summary reports and the jurisdiction summary reports
- the *Student Achievement Testing Program Bulletins*, where the description of the pilot test can be found
- the test specifications for the new Grade 9 Mathematics Program of Studies provided by the Curriculum Design Branch and the Language Services Branch
- the Grade 9 Mathematics Pilot Test administered in 1988.

Information from all of these documents should enable teachers, principals, superintendents, and others to gain a better understanding of the new Grade 9 Mathematics Program.

The "Guidelines for Interpreting the Test Results," on page 2 of this document, should be read carefully before interpretations are made of a specific report for an individual jurisdiction or school.

GUIDELINES FOR INTERPRETING THE TEST RESULTS

The pilot test results are based on the scores achieved by 1 867 students who participated in the new Grade 9 Mathematics Program during the 1987-88 school year. It is strongly recommended that educators or others who are involved with interpreting the pilot test results take the following factors into consideration:

1. The test was designed to reflect the interpretation and expectations of the new Grade 9 Mathematics Program. It was not designed to establish a benchmark for the program.
2. The Grade 9 Mathematics Pilot Test construction was limited by the
 - short time period for development
 - few resources available in terms of the number of teachers who were familiar with the new curriculum
 - small number of schools that had implemented the new program during the field testing period.
3. The number of students who wrote the pilot test was relatively small compared with the total Grade 9 population. Consequently, they may not have been representative of the total Grade 9 population. As well, it is known that some schools whose students wrote the pilot test did not fully implement the new program. Therefore,
 - generalization of the pilot test results to the total Grade 9 population is not recommended
 - comparison between school or jurisdiction results with provincial results should be made with caution
 - individual student results should be interpreted carefully and should not be used for special grouping or placement purposes.
4. Comparison of student achievement between those who wrote the achievement test and those who wrote the pilot test is inappropriate as
 - there was a minor change in content but a major shift in philosophy in the new mathematics program compared to the current mathematics program
 - the achievement test and the pilot test are not parallel in content and difficulty.

Consequently, some questions that appeared on the pilot test did not possess all acceptable item characteristics. This may have affected the degree of reliability of the test.

DESCRIPTION OF THE GRADE 9 MATHEMATICS PILOT TEST

General Description

The Grade 9 Mathematics Pilot Test was administered on June 14, 1988.

The test consisted of 75 multiple-choice questions answered by students on machine-scorable answer sheets. The time allotted for writing the Grade 9 Mathematics Pilot Test was 90 minutes.

The scope of the test was limited to curriculum objectives that could be efficiently measured on a paper and pencil test.

Content of the Test

The Grade 9 Mathematics Pilot Test was designed to reflect the *Grade 9 Mathematics Curriculum Specifications* (March 1987). These specifications reflect the content objectives in

the *Program of Studies for Junior High Mathematics, 1987*. The two major components of the new Grade 9 Mathematics curriculum and the emphasis that each component is to receive according to the *Grade 9 Mathematics Curriculum Specifications* form the basis for the test. These two components are

<u>Component</u>	<u>Emphasis (%)</u>
Subject Matter	80
Problem-Solving Skills	20

The subject-matter component covers five strands, and the problem-solving skills component is divided into two parts: problem solving integrated with subject matter, and problem-solving strategies. The number of questions allotted to each subject-matter strand and to each part of the problem-solving skills component are

	<u>Subject Matter</u>	<u>Problem Solving</u>	<u>Total</u>
Number Systems and Operations	14	2	16
Ratio and Proportion	8	4	12
Measurement and Geometry	15	3	18
Data Management	10	2	12
Algebra	13	1	14
Problem-Solving Strategies	-	3	3
Total	60	15	75

Questions on the Grade 9 Mathematics Pilot Test measured student achievement at three cognitive levels. These were

- Knowledge (recall, memorize, perform routine computations)
- Comprehension (perform algorithms,

demonstrate understanding of principles and concepts, interpret, translate)

- Application (formulate the problem symbolically, then manipulate the symbolic representation according to some previously learned algorithms)

Test Blueprint

Table 1 presents the blueprint used to develop the Grade 9 Mathematics Pilot Test. Classification by strand (reporting category),

cognitive level, and problem solving for each question included in the test is presented in Table 1.

Table 1
Grade 9 Mathematics Pilot Test
Blueprint

Strand	Subject Matter By Cognitive Level			Problem Solving	Emphasis (%)
	Knowledge	Comprehension	Application		
Number Systems and Operations	3,14,15,16,18	1,2,4,8,11,12,13,17	9	5,10	21.3
Ratio and Proportion	19,22	20,26	23,24,27,28	21,25,29,30	16.0
Measurement and Geometry	31,41,42	34,35,36,40,43,44	32,37,39,45,47,48	33,38,46	24.0
Data Management	57,59,60	50,52,55	51,53,56,58	54,61	16.0
Algebra	64	62,65,66,67,68,69,71,72,73,74,75	63	70	18.7
Problem-Solving Strategies				6,7,49	4.0
Emphasis (%)	18.7	40.0	21.3	20.0	100.0

TEST RESULTS

Provincial test results were based on the scores achieved by the 1 867 students who completed the Grade 9 Mathematics Pilot Test. The provincial results for the total test, in percentage points, were as follows:

- Provincial Average - 53.2
- Standard Deviation - 15.4

The KR-20 reliability coefficient for the Grade 9 Mathematics Pilot Test was 0.89.

As outlined in the blueprint, the questions on the Grade 9 Mathematics Pilot Test have been grouped into subtests according to subject strands, or reporting categories and problem-solving skills.

Provincial averages for these subtests and for the total test are presented in Table 2. Provincial averages were computed and rounded to one decimal. Consequently, the sum of the averages for the subtests is not exactly the same as the average for the total test.

Table 2
Grade 9 Mathematics Pilot Test
Raw Score Results by Subtest

Subtest	Number of Questions	Average	Standard Deviation
Total Test	75	39.9	11.6
Strand (Reporting Category)			
Number Systems and Operations	16	8.9	3.1
Ratio and Proportion	12	7.6	2.2
Measurement and Geometry	18	9.0	3.6
Data Management	12	6.7	2.4
Algebra	14	6.1	2.8
Problem-Solving Strategies	3	1.0	0.8
Cognitive Level			
Knowledge	14	9.0	2.6
Comprehension	30	15.2	5.1
Application	16	9.4	3.3
Problem-Solving Skills	15	6.4	2.5

Table 3 presents the percentage of students who obtained each score on the Grade 9 Mathematics Pilot Test

(relative frequency) and the percentage of students scoring at or below each score (cumulative frequency).

Table 3
Grade 9 Mathematics Pilot Test
Frequency Distribution of Raw Scores

Raw Score	Relative Frequency (%)	Cumulative Frequency (%)	Raw Score	Relative Frequency (%)	Cumulative Frequency (%)
0	0.0	0.0	38	3.5	47.2
1	0.0	0.0	39	2.5	49.7
2	0.0	0.0	40	3.3	53.0
3	0.0	0.0	41	3.1	56.1
4	0.0	0.0	42	3.0	59.1
5	0.0	0.0	43	2.7	61.8
6	0.0	0.0	44	2.8	64.6
7	0.0	0.0	45	3.0	67.6
8	0.0	0.0	46	2.9	70.5
9	0.0	0.0	47	2.5	73.0
10	0.0	0.0	48	2.9	76.0
11	0.0	0.0	49	2.1	78.0
12	0.1	0.1	50	1.9	80.0
13	0.1	0.1	51	2.4	82.3
14	0.0	0.1	52	1.7	84.0
15	0.3	0.4	53	2.4	86.4
16	0.5	0.9	54	1.8	88.2
17	0.1	1.0	55	1.5	89.7
18	0.6	1.6	56	1.6	91.3
19	1.1	2.7	57	1.1	92.4
20	0.9	3.6	58	1.2	93.6
21	0.8	4.4	59	1.0	94.6
22	0.8	5.2	60	1.0	95.6
23	1.3	6.5	61	0.9	96.5
24	2.1	8.6	62	0.9	97.4
25	2.2	10.9	63	1.0	98.3
26	2.3	13.2	64	0.3	98.6
27	2.1	15.3	65	0.2	98.8
28	2.8	18.1	66	0.4	99.2
29	2.6	20.7	67	0.1	99.3
30	2.9	23.7	68	0.2	99.5
31	3.2	26.8	69	0.3	99.7
32	2.9	29.7	70	0.1	99.8
33	3.7	33.5	71	0.2	100.0
34	2.6	36.0	72	0.0	100.0
35	2.5	38.5	73	0.0	100.0
36	2.6	41.1	74	0.0	100.0
37	2.5	43.7	75	0.0	100.0

Table 4 presents the percentage of students choosing each alternative (A, B, C, and D) for each multiple-choice question on the Grade 9

Mathematics Pilot Test. The correct response (key) for each question is also identified.

Table 4
Grade 9 Mathematics Pilot Test
Results for Individual Multiple-Choice Questions

Item	Key	Distribution of Responses* (%)				Item	Key	Distribution of Responses* (%)			
		A	B	C	D			A	B	C	D
1	D	2.0	3.6	19.1	74.9	39	D	3.1	19.0	8.3	69.4
2	B	41.0	19.7	4.2	34.7	40	C	24.3	8.6	47.2	19.6
3	C	0.1	3.9	93.3	2.8	41	A	32.0	39.7	14.1	13.4
4	A	49.3	26.1	9.1	15.1	42	D	7.8	14.2	14.8	62.5
5	A	56.8	3.9	31.3	7.9	43	B	7.3	50.2	38.3	3.9
6	D	10.1	19.6	13.0	57.2	44	A	63.4	9.3	15.9	10.9
7	D	29.3	26.6	24.7	18.9	45	B	21.3	56.8	16.6	4.7
8	D	13.9	4.9	11.5	69.5	46	A	34.8	19.0	24.1	20.5
9	D	16.9	5.0	14.2	63.7	47	A	50.8	21.0	16.0	11.5
10	C	18.4	29.4	35.0	15.6	48	D	6.6	15.2	15.9	61.5
11	D	7.6	30.4	13.4	48.5	49	D	17.5	36.0	21.6	23.7
12	B	52.3	26.9	15.5	5.0	50	D	2.3	5.7	21.0	70.5
13	A	51.2	14.8	21.8	11.4	51	B	9.2	64.7	7.9	17.9
14	C	2.1	14.6	80.9	2.1	52	D	7.5	5.2	5.6	81.4
15	D	33.6	5.8	23.2	36.4	53	A	44.0	5.6	43.5	6.5
16	A	50.1	24.4	15.5	9.9	54	C	28.2	7.5	58.9	4.8
17	D	5.6	19.9	12.2	62.0	55	D	10.5	12.5	26.8	49.5
18	C	2.5	12.2	70.3	14.7	56	C	26.4	33.4	27.0	11.7
19	B	1.7	93.4	4.4	0.4	57	A	45.4	14.6	35.6	3.4
20	A	81.9	9.5	4.8	3.5	58	C	18.1	12.5	61.0	6.7
21	C	3.6	26.4	62.1	7.0	59	A	55.2	20.7	12.2	10.6
22	B	5.4	77.0	13.2	4.1	60	C	9.3	8.2	69.7	11.7
23	D	4.4	6.9	15.0	73.1	61	C	22.4	24.2	45.7	6.5
24	B	9.0	70.4	11.1	9.1	62	D	15.3	10.8	11.0	61.7
25	B	49.1	24.7	18.2	7.0	63	A	61.2	12.9	16.1	8.4
26	B	7.0	78.1	9.4	5.1	64	C	8.1	13.1	63.3	14.0
27	B	7.3	65.0	22.6	4.6	65	B	14.2	45.0	30.0	8.5
28	C	19.8	15.6	56.7	7.6	66	A	62.3	20.1	10.0	5.2
29	C	14.6	29.9	39.9	14.9	67	B	51.2	31.4	8.1	7.0
30	C	12.7	32.1	38.1	15.9	68	A	31.6	12.9	40.5	12.3
31	C	6.1	19.8	66.5	7.3	69	D	17.8	28.7	26.4	24.0
32	C	39.5	3.7	53.2	3.5	70	C	24.8	22.4	36.1	13.3
33	B	13.1	66.1	15.7	5.0	71	B	25.1	36.5	12.3	23.0
34	A	64.4	15.8	9.9	9.6	72	B	32.6	35.1	17.0	12.3
35	C	13.1	32.4	43.0	11.3	73	C	21.9	25.2	35.4	14.2
36	B	37.2	40.0	15.0	7.3	74	B	35.3	27.6	23.7	10.4
37	C	3.6	26.2	60.6	8.9	75	B	12.7	55.3	15.7	13.2
38	B	13.1	41.4	36.0	7.9						

*The sum of the percentages for each question may be less than 100% because the No Response category is not included. The No Response category does not exceed 3.4% for any one of these questions.

N.L.C. - B.N.C.



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